Lighter than Air Systems
Prof. Rajkumar S. Pant
Department of Aerospace Engineering
Indian Institute of Technology, Bombay

Module No # 01
Lecture No # 05
Introduction of Sky ship 600 and USP of Airships

Today we start with the short video of one of the modern airships which was developed in mid-eighties the sky ships 600.

(Video Starts: 00:25)

This is a clip recorded during the maiden flights at airship and this will give an idea about what modern airships are as against what you might have in your mind, regarding the first time sky ship 600 has emerged from the royal aircraft establishment of Carrington the traditional shrine of British airship aviation. Now this famous landmark has the latest generation of lighter than aircraft designed and built by airship industries and packed with state of the art aviation technology.

The world's media were out reinforce to witness 600 maiden flight reflecting the global interest in this multipurpose craft. The 600 is a stretched version of the earlier sky ship 500 with passenger capacity doubled from 10 to 20 seats increasing speed increased to 55 knots airborne endurance to in remarkable 48 hours and virtually every other aspect of aircraft refined and upgraded satisfied with the running of the twin turbo charged podded engines.

Chief test pilot commander Nick Bennett was now ready for takeoff using only alone power setting the 600 executed a perfect 0 roll takeoff and climbed steeply and quietly into the sky she had entered her element and was performing to the highest expectations of the airship industries team. Starship 600 ability to stay airborne or 48 hours gives her unique operational flexibility and the non-combustible helium lift gas has eliminated the fire hazards normally associated with hydrogen in her civil role the ship can be transformed into an eye catching aerial advertisement.

She can be used for promotional and pleasure flights and she provides a perfect platform for aerial photography without any of the vibration and operational problems usually associated with conventional craft. As an eye in the sky the 600 can fulfill many defense roles slow flight

unparalleled endurance and large payload volume eminently qualifies sky ship for coastal and maritime patrol including fishery convection, navigation, monitoring and pollution control as well as airborne early warning anti-submarine warfare and mine sweeping.

Already defense and coast guard agencies from Britain, America and France are conducting technical evaluations on sky ship 600. After many of hours flying pilot Nick Bennett makes a steep approach to the airfield and brings the ship to a stable hover prior to landing. The vectored thrust engines allow total control in positioning the craft and the rate of descent can be accurately adjusted to suit any payload.

This capability to take off and land vertically make the craft unique among airships gone are the days when fast tracts of runway were needed for their operation the sky ships of airship industries can easily take off and land unprepared ground the size of a football pitch. Once on the ground the ship docks quickly and easily secured to the mast she needs no further tethering no restraint.

The maiden flight had been an unqualified success the concept has been to take a very good old idea of buoyant flight. And then to use new materials or to the best advantage in order to get the structure weight down as low as possible and this is not achievable. So the use of the new materials is enabling us to save weight and weight in an airship is absolutely fundamental because the gas has got to lift the structure as the whole line you can get a structural weight badge next nothing you can see the lift.

That is exactly what airship industries have done already the sky ship 500 is in service in the united states and Japan. And after this tremendously successful maiden flight the 600 is heading for even wider markets.

(Video Ends: 06:14)

Okay so this was a promotional video by the company called as global sky ship industries or air ship industries at that time. They are they have described in this video the modification of a previous airship called as sky ship 500. So this particular airship that you saw is the one that kind of revived the LTA technology in the mid-eighties. But let us take one step further and look at the most modern airship available today for passenger transport and that is called as the Zeppelin.

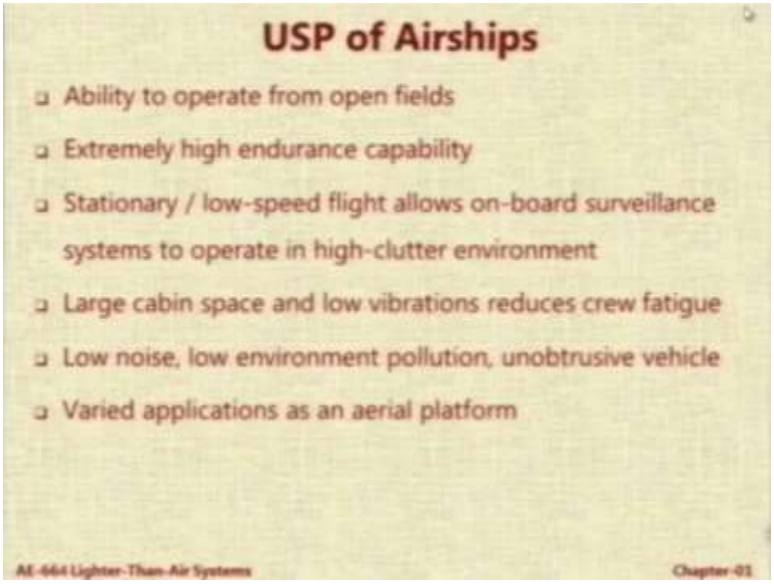
(Video Starts: 06:50)

That the engines on both sides and there is one of the engines back side which will come fixed on the mass will remove the engines have been picked up to give direct vertical thrust and once the aircraft was left the ground now the engines will be forward to give forward motion.

(Video ends: 08:10)

This third engine on the back which I am right now pointing here gives a direct side force to control the airship.

(Refer Slide Time: 08:22)



So these are the modern airships and what you see now are the USP's of airships. Can anybody in the audience explain the meaning of the work USP unique selling point or unique selling proposition? What do airships have to offer which is unique and which can make themselves or stand out against other alternatives which are available. So these are some of the important USP's of airships as we have seen in both the films.

And airship does not require a runway it does not require an elaborate airport infrastructure virtually any field is sufficient to operate airships. Typically we say that the length and the width of the ground should be approximately 1.3 times the length of the airship and that is sufficient for it to operate safely. Similarly you must have heard that the endurance of sky ship 600 is 48 hours as against this can someone share with me what is your understanding of the maximum endurance of any other manned aircraft.

That means once you fill fuel without refueling how long can you fly a manned aircraft 16, 17 hours okay. Is the typical endurance of a manned aircraft as against that an airship can easily operate in 48 hours for 48 hours and in 1 trial we also went up to 52 hours of non-stop flight. The third aspect of airships is something that may people makes use of for scientific technical or commercial work.

Applications in which you need either a low speed flight or the ability for the aircraft to remain stationary for sometimes or for long periods of time. And you want an environment which has got lower levels of vibration lower levels of mechanical clutter. For example if there is a helicopter which can do the same things 2 main problems are excessive fuel consumption high levels of vibration which have to be isolated in order to get any meaningful data or pictures from the helicopter.

It is possible and there are correctional algorithms available which will automatically cancel out the vibrations. But still it is a not a straight forward thing plus the helicopter is very sensitive to presence of obstacles in the vicinity. And a small mistake can lead to a fatal crash as we have seen so many accident videos of helicopter if the tail rotors hits in any object or obstacle or the main rotor normally we have a catastrophe.

The airship will allow a large cabins to space with low vibration level and hence the crew can fly. If you have to fly for 48 hours of 40 hours nonstop you need have comfortable environment it is very difficult to fly more than 2 hours in a helicopter. And it gives you a low noise vehicle because the propulsion system as to do less work as I mentioned the gravity is taken care by the buoyancy.

So there is less work to do so smaller engines hence in general lower noise levels. Lesser fuel consumptions means lower pollution and when I say unobtrusive vehicle I mean a vehicle that does not disturb the things below. Below a helicopter you have a massive wash or you have this vortex below the rotor and this kind of rotor wash which is also there below quad-copters can actually sometimes disturb or interfere with the activities happening below.

Imagine if there is a football or a cricket match going on and you bring a helicopter to take aerial video obviously it will create lot of disturbances to the activities happening below. Let us say you

want to do observation of marine, fishery or other let us say you want to observe animals in their natural habitat presence of a helicopter is going to create lot of vibrations and they will not be there in the natural environment. So in short the bottom line is that an airship can be used for various applications as an aerial platform.